Amendments to the claims:

1. (Amended) A system for use in tomographic imaging of a scattering medium, comprising:

a plurality of energy sources, each ~~an~~ energy source ~~for~~ emitting a respective signal for imaging the scattering medium;

wherein the plurality of energy sources emit their respective signals sequentially, and the respective signals are scattered by the scattering medium and emerge from the scattering medium; ~~and having at least one energy transmitter coupled thereto;~~ and

~~a detection system~~ a plurality of detectors for detecting the respective signals that emerge from the scattering medium for use in measuring dynamic properties of the scattering medium in a time series of images using optical tomography.

~~coupled to the energy source and including at least one energy receiver for measuring dynamic properties of the scattering medium.~~

2. (Amended) The system of claim 1, further comprising:

~~further including~~ an imaging head on which the energy sources and the detectors are arranged;

wherein the energy sources and the detectors are arranged in a plurality of linear arrays to enable reconstruction of a corresponding plurality of 2-D images of the scattering medium~~coupled as the energy transmitter and energy receiver for holding thereof~~.

3. (Cancelled)

4. (Amended) The system of claim 1, further comprising ~~wherein the detection system further includes at least one gain adjustment~~ means for ~~increasing~~ adjusting a gain of at least one of the detectors, when the at least one of the detectors detects the respective signal from one of the energy sources, according to a position of the one of the energy sources.

~~dynamic range of the detector system.~~

5. (Amended) The system of claim 1, ~~wherein the detection system further includes~~further comprising at least one ~~a~~ sample-and-hold circuit for freezing the respective signals detected by the detectors to enable a simultaneous readout of the respective signals detected by the detectors.

~~emitted by the energy source.~~

6. (Cancelled)

7. (Amended) The system of clam 1, wherein the energy ~~source~~ sources include ~~includes~~ at ~~lest~~ least one of a non-laser optical source ~~sources~~, LED, ~~and~~ high-pressure incandescent lamp, laser ~~diodes~~ diode, solid state ~~lasers~~ laser, titanium-sapphire laser, ruby laser, dye laser, electromagnetic ~~sources~~ source, acoustic energy source, acoustic energy produced by optical energy, optical energy, and combinations thereof.

8. (Amended) The system of claim 1, wherein data acquisition from the ~~detection system~~ detectors is at a rate of about ~~150Hz~~ 100 Hz.

9. (Amended) The system of claim 1, wherein the energy sources ~~includes~~ include ~~a plurality of~~ near infra red laser diodes ~~to~~ that transmit multiple wavelengths.

10. (Cancelled)

11. (Amended) The ~~detection~~ system of claim 1 ~~10~~, wherein the detectors ~~energy receiver includes~~ include at least one of a photo-diode, PIN diode, Avalanche ~~photodiodes~~ photodiode, ~~change~~ charge coupled ~~couple~~ device, ~~change~~charge inductive device, photo-multiplier ~~tubes~~ tube, multi-channel plate, acoustic ~~transducers~~ transducer, and any combinations thereof.

12. (Amended) The ~~detection~~ system of claim 4 ~~10~~, further including a sample-and-hold circuit coupled to the means for adjusting ~~programmable gain instrumentation amplifier~~ that allows simultaneous readout of the respective ~~a plurality of~~ signals ~~from the energy source~~ detected by the detectors.

13. (Amended) A system for use in optical tomographic imaging of a scattering medium comprising:

at least one energy transmissive fiber bundle coupled to ~~an~~ at least one energy source~~-~~;

the at least one energy transmissive fiber bundle emitting energy from the at least one energy source, and detecting the energy after it is scattered by the scattering medium;

an imaging head for holding the at least one energy transmissive fiber bundle; and

a detection system for collecting data ~~about~~ regarding the optical dynamic properties of the scattering medium from the detected energy;

wherein the imaging head undergoes uniform expansion and contraction to accommodate different size scattering mediums.

14. (Amended) The system of claim 13, wherein the at least one energy transmissive fiber bundle is bifurcated to both ~~transmit~~ emit and detect energy.

15. (Cancelled)

16. (Amended) The system of claim 13, wherein the imaging head comprises ~~is~~ a folding sphere or polygon.

17. (Cancelled)

18. (Amended) The system of claim 13 ~~16~~, wherein the at least one energy transmissive fiber bundle comprises a plurality of energy transmissive fiber bundles ~~is~~ disposed about the imaging head.

Claims 19 and 20. (Cancelled)

21. (Amended) A method of imaging a scattering medium using optical tomographic imaging, comprising:

(a) exposing the ~~a~~ scattering medium to ~~near infra-red light~~ energy from a plurality of energy sources that sequentially emit the energy; ~~for collecting data about the dynamic properties of a scattering medium,~~ ; and

(b) detecting the energy ~~light~~, via a plurality of detectors, ~~by a detection system~~ after the energy has been scattered by the scattering medium for use in measuring dynamic properties of the scattering medium in a time series of images using optical tomography.

~~; and~~

~~(c) enhancing gain through a programmable gain instrumentation amplifier for the purpose of measuring the dynamic properties of the scattering medium.~~

22. (Amended) The method of claim 21, wherein the scattering medium comprises ~~is~~ vascular tissue ~~tissues~~.

Claims 23-25. (Cancelled)

26. (Amended) The system of claim ~~25~~ 1, wherein the ~~optical energy~~ respective signals emitted by the energy sources comprise ~~comprises~~ optical energy of at least two different intensity modulated wavelengths of energy.

27. (Amended) The system of claim 26, further comprising a ~~filtering means~~ filter for separating signals corresponding to a wavelength of the intensity modulated energy.

Claims 28-31. (Cancelled)

32. (Amended) The system of claim 1 ~~25~~, wherein the respective detectors ~~are~~ comprise respective fibers coupled to respective optical energy detectors.

33. (Cancelled)

34. (Amended) An imaging head, comprising:

a pad;

a plurality of source means for delivering optical energy to a medium; and

a plurality of detector means for detecting optical energy emerging from the ~~a~~ medium;~~,~~ wherein:

-the source means and detector means ~~being~~ are attached to the pad in a plurality of rows and columns wherein the plurality of source means are arranged to form at least two unique imaging planes, an imaging plane being between defined by a plane substantially perpendicular to the pad and passing through at least two source means and one detector means;~~.~~ and

the source means and detector means are arranged in first and second patterns in alternating rows, the first pattern comprising one source means followed by three detector means followed by one source means followed by three detector means, and the second pattern comprising a shifted version of the first pattern.

35. (Cancelled)

36. (Amended) The imaging head of claim 34, wherein the source means ~~are~~ comprise fibers coupled to an optical energy source.

37. (Amended) The imaging head of claim 34, wherein the source means ~~are~~ comprise optical energy sources.

38. (Amended) The imaging head of claim 34, wherein the source means ~~is~~ comprise laser diodes.

39. (Amended) The imaging head of claim 34, wherein the detector means ~~are~~ comprise fibers coupled to optical energy detectors.

40. (Amended) The imaging head of claim 34 wherein the detector means ~~are~~ comprise optical energy detectors.

41. (Amended) The imaging head of claim 34 wherein the detector means ~~are~~ comprise photodiodes.

Claims 42-52. (Cancelled)

53. (Amended) The ~~imaging head~~ system of claim 1 ~~52~~, wherein the energy sources and the detectors are ~~transmitters define~~ arranged in an illumination array that is configured to minimize subsequent numerical effort required for data analysis and maximizing source density covered by the illumination array.

54. (Amended) The ~~imaging head~~ system of claim 53, wherein the energy sources and the detectors are arranged in the illumination array to enable three dimensional images to ~~can~~ be computed from super positioning of ~~the array of~~ two dimensional images.

55. (Amended) The detection system of claim 1 ~~10~~, wherein the detectors ~~energy receiver~~ further detect ~~detects~~ fluorescence radiation excited by the energy sources ~~source~~.

56. (Amended) The detection system of claim 1 ~~10~~, wherein the detectors ~~energy receiver~~ further detect ~~detects~~ acoustic energy produced in the scattering medium by the energy sources ~~an optical source~~.

57. (Cancelled)

58. (Amended) The system of claim 13, wherein the at least one energy transmissive fiber bundle terminates inside the scattering medium

59. (Amended) The method of claim 21, further including ~~the step of~~ evaluating the dynamics in an industrial mixing process for at least one of a gas and a liquid according to the detected energy ~~materials selected from the group consisting of powder, gas, liquid, porous material, and combinations thereof~~.

60. (Amended) The method of claim 21, further including ~~the step of~~ evaluating dynamics in a foggy ~~atmospheres~~ atmosphere according to the detected energy ~~for meteorology~~.

61. (Amended) The method of claim 21, further including ~~the step of~~ evaluating dynamics in oceans or water masses according to the detected energy.

62. (New) The system of claim 1, further comprising means for adjusting a gain of at least one of the detectors according to respective positions of the energy sources.

63. (New) The system of claim 1, further comprising means for adjusting respective gains of the detectors according to respective positions of the energy sources.

64. (New) The system of claim 1, wherein distances between source-detector pairs of the energy sources and the detectors vary over a distance of at least about 5 cm.

65. (New) The system of claim 1, wherein the scattering medium comprises a large tissue structure.

66. (New) The system of claim 1, further comprising a data acquisition unit for reconstructing the time series of images of the scattering medium based on the respective signals detected by the detectors.

67. (New) The system of claim 2, wherein there are varying numbers of pairs of the energy sources and the detectors in the linear arrays.

68. (New) The system of claim 4, wherein the means for adjusting comprises a programmable gain amplifier.

69. (New) The system of claim 13, wherein the imaging head undergoes uniform expansion and contraction while preserving a hemispherical geometry to accommodate different size scattering mediums

70. (New) The system of claim 13, wherein the imaging head includes a target volume through which the scattering medium enters the imaging head.

71. (New) The system of claim 13, wherein detector fibers of the at least one energy transmissive fiber bundle are located on an inner aspect of the imaging head.

72. (New) The system of claim 18, wherein the imaging head comprises a Hoberman sphere, about which the plurality of energy transmissive fiber bundles are disposed.

73. (New) The system of claim 18, wherein the plurality of energy transmissive fiber bundles are attached to vertices of a hemisphere of the imaging head.

74. (New) The system of claim 18, wherein the plurality of energy transmissive fiber bundles are attached to interlocking joints of the imaging head.

75. (New) The method of claim 21, further comprising adjusting respective gains by which the energy is detected by the detectors according to respective positions of the energy sources.

76. (New) The method of claim 21, wherein the energy comprises near infra-red light.

77. (New) The method of claim 21, wherein distances between source-detector pairs of the energy sources and the detectors vary over a distance of at least about 5 cm.

78. (New) The method of claim 21, wherein the scattering medium comprises a large tissue structure.

79. (New) The system of claim 1, further comprising:

an imaging head on which the energy sources and the detectors are arranged;

wherein the energy sources and the detectors are arranged in a plurality of linear arrays to enable reconstruction of a 3-D image of the scattering medium.